Mississippi State Department Of Health

TRAUMA

Annual Report 1998

Preface

Trauma Report Fiscal Year 1998, examines the history of trauma system development nationwide as well as in Mississippi. The fourth published report for the State Trauma Registry, this report is also an appendix to the *Emergency Medical Services Fiscal Year Report 1998*.

The report examines year-end totals submitted from seven trauma registry sites, not statewide totals. The data represents statewide information, depicting trends in similar ways.

The Division of EMS is committed to the development of a statewide trauma system to ensure Mississippians receive quality trauma care. In the coming year, many steps will be taken toward the goal of a complete trauma care system.

To use *Trauma Report Fiscal Year 1998*, the reader should refer to —

Chapter 1
Trauma, The Neglected Disease of Modern Society

During the mid 1960s, the National Research Council issued a white paper labeling trauma "the neglected disease of modern society." In 1985, the book *Injury in America; A Continuing Public Health Problem* confirmed that little progress had been made and that the neglected disease remained neglected. During that time period, numerous published trauma death studies demonstrated that as much as one third of trauma deaths occurring in areas without organized trauma care systems were preventable.

The American College of Surgeons developed criteria for the designation of trauma centers and the establishment of trauma systems. States and regions of states that have adopted these criteria or similar trauma care standards have experienced a dramatic reduction in the percentage of preventable deaths. Despite the documented effectiveness of trauma systems, most states have yet to implement them.

Recognizing this fact, the National Highway Traffic Safety Administration developed and implemented a curriculum (*Development of Trauma Systems: A State and Community Guide*) to emphasize the trauma problem nationally and to teach concepts in developing trauma systems during the 1990s. Then Congress of the United States further proclaimed the need for trauma care programs through passage of the Trauma Systems Planning and Development Act of 1990. This Act provided a significant federal funding program for this disease category.

The passage of legislation during the 1991 Mississippi legislative session designated the Division of Emergency Medical Services (DEMS), Mississippi State Department of Health (MSDH), as the lead agency for trauma systems development in Mississippi.

Amendment to the EMS Act of 1974

The State Department of Health, Division of Emergency Medical Services, acting as the lead agency, in consultation with and having solicited advice from the EMS Advisory Council, shall develop and submit to the Legislature a plan for the triage, transport and treatment of major trauma victims that at minimum addresses the following:

- The magnitude of the trauma problem in Mississippi and the need for a statewide system of trauma care;
- The structure and organization of a trauma care system for Mississippi;
- Prehospital care management guidelines for triage and transportation of major trauma victims;
- Trauma system design and resources, including air transportation services, and provision for interfacility transfer;
- Guidelines for resources, equipment and personnel within facilities treating major trauma victims;
- Data collection and evaluation regarding system operation, patient outcome and quality improvement;
- Public information and education about the trauma system;
- Medical control and accountability;
- Confidentiality of patient care information;
- Cost of major trauma in Mississippi; and
- Research alternatives and recommendations for financial assistance of the trauma system in Mississippi, including, but not limited to, trauma system management and uncompensated trauma care.

Since the passage of this law, the Trauma Care Plan for the State of Mississippi has been written and adopted. DEMS has now begun implementation of the plan.

The first step DEMS took in developing a statewide trauma system was the implementation of a statewide trauma registry. In 1992, DEMS began the organizational process for issuing a request for proposal (RFP) from three vendors: TriAnalytics, the American College of Surgeons, and Cales and Associates. Strict criteria were established by DEMS and outside consultants to ensure the registry would meet the needs of the state. After a stringent review process, Cales and Associates was awarded the contract in 1993. The original contract consisted of licenses for five registry sites, along with the state registry software. The trauma registry was then installed in the five regional trauma centers strategically located throughout the state:

- Forrest General Hospital, Hattiesburg
- Greenwood-Leflore County Hospital, Greenwood
- North Mississippi Medical Center, Tupelo
- Singing River Hospital, Pascagoula
- University of Mississippi Medical Center, Jackson.

In 1997, DEMS purchased the statewide license agreement from Cales and Associates making the Hospital Trauma Registry available to any Mississippi hospital wanting to participate in the State Trauma Registry System. The registry is currently being implemented in several hospitals statewide. This expansion will provide a stable foundation for the development of a statewide trauma system.

The 1997 Legislature created the Mississippi EMS Trauma Care Task Force to research the status of trauma and its significance in the state. The membership of the task force was as follows:

- The Director of the Division of Emergency Medical Services
- Representative from each of the five original trauma registry hospitals
- Physician appointed by the Mississippi Chapter of the American College of Surgeons
- Physician appointed by the Mississippi Chapter of the American College of Emergency Physicians
- Emergency Medical Technician appointed by the State Department of Health
- Registered Nurse appointed by the State Department of Health
- Two members of the House of Representatives
- Two members of the Senate
- Representative of the Mississippi Hospital Association
- Member of the Governor's staff
- Victim of trauma appointed by the Governor.

The task force focused on three developmental areas for the implementation of a statewide trauma system. These are:

- Prevention and public awareness
- Financial support and legislative authority
- Prehospital and hospital standards of trauma care.

The recommendations of the TCTF were formalized into a report that was due to the Governor and Legislature on December 15, 1997.

H.B. 966 — Mississippi Trauma Care System Act

The 1998 Legislature took to heart the report given to them by the Trauma Care Task Force and passed legislation giving the Division of Emergency Medical Services, Mississippi State Department of Health the authority to develop a statewide trauma care system. It also expands the existing EMS Advisory Council to include trauma care professionals, which make up the Mississippi Trauma Advisory Committee (MTAC). The MTAC is composed of representative from the following associations

plus other EMS Advisory Council members appointed by the Chairman:

- Neurosurgeon appointed by the State Medical Association
- Registered Nurse appointed by the Emergency Nurses Association
- Emergency Medical Technician-Paramedic appointed by State Board of Health
- Representative appointed by the Mississippi Dept. of Rehabilitative Services
- Victim of Trauma appointed by the Governor
- Regional Representative from each designated trauma region(currently 6).

Finally, H.B. 966 provides permanent funding through a $5 assessment on all moving traffic violations, creating the Trauma Care Trust Fund. This money will be available for administrative functions at both the state and regional levels.

The passage of this legislation means many things to different entities. Participation in the statewide system is voluntary. Hospitals and medical staff will make the decision to participate. If an acute care facility decides to participate, it will work in conjunction with other facilities in its region to develop regional plans and protocols. Pre-hospital providers will receive new trauma specific training, new field triage protocols, and will become more involved in the evaluation of patient outcomes. What H.B. 966 means to Mississippians is the Right Patient will be sent to the Right Hospital in the Right Amount of Time. This will result in reduced morbidity and mortality to the citizens of our state.

Chapter 2
Demographics and Injury Severity

In the United States, injury is recognized as a major public health problem. Trauma (unintentional and intentional) is the fourth leading cause of all deaths for all age groups. The shocking fact is that trauma is the number one cause of death among persons age 0-44. More than 135,000 people die from traumatic injury every year n this country. Between eight and nine million people suffer disabling injuries in the United States annually, with more than 300,000 of them suffering permanent disability. Unintentional and intentional injuries were the overall third leading cause of death in Mississippi with a total of 2,306 occurrences. Over 56,000 years of potential life lost before age 65 occurred in Mississippi in 1997 for all accidental deaths, homicides, and suicides.

The Abbreviated Injury Scale (AIS) is an anatomical scoring system first introduced in the late 1960's. It has been revised and updated against survivability outcomes of patients. Now it provides a fairly accurate method of ranking the severity of injury. AIS, which had it's latest revision in 1998, is monitored by a scaling committee of the Association for the Advancement of Automotive Medicine.

Injuries are ranked on a scale of 1 to 6. This represents the "threat to life" associated with an injury and is not meant to represent a comprehensive measure of severity. An injury with a score of 1 is considered to be a minor injury, an injury with a 5 is critical and 6, unsurvivable.

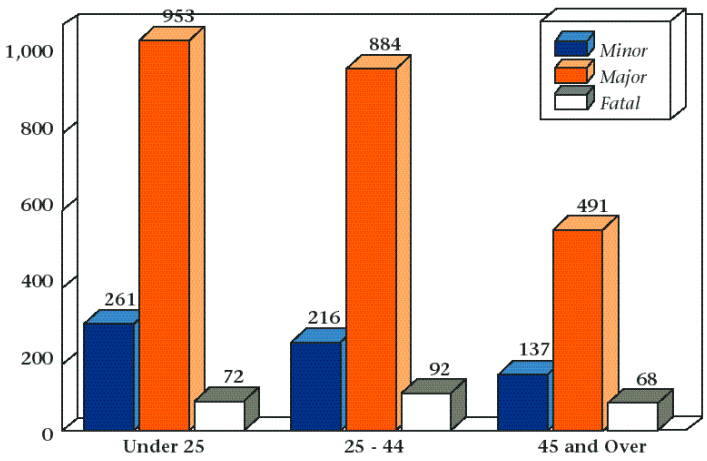
The Injury Severity Score (ISS) is an anatomical scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an AIS score and is allocated to one of six body regions – Head, Face, Chest, Abdomen, Extremities (including Pelvis), and External. Only the highest AIS score in each body region is used. The 3 most severely injured body regions have their score squared and added together to produce the ISS score. The ISS score takes values from 0 to 75. If an injury is assigned an AIS of 6, which is an unsurvivable injury, the ISS score is automatically assigned to 75. The ISS score correlates with mortality, morbidity, hospital stay, and other measures of severity.

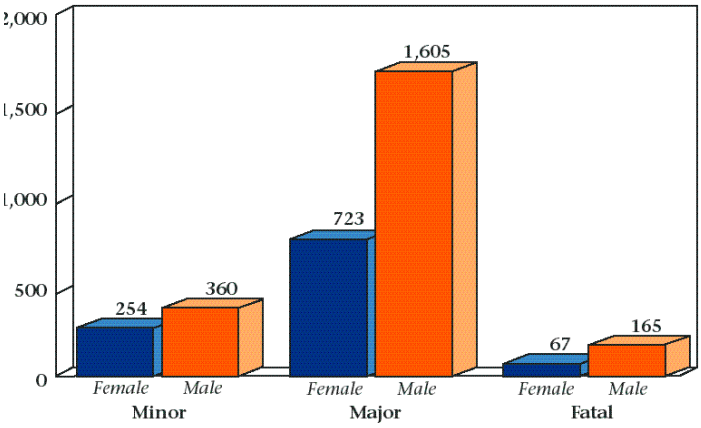
The State Trauma Registry groups patients in three categories, major, minor, or fatal. The definition of a major trauma includes any patient who is know or reasonably suspected to have sustained an injury that merits treatment by a trauma care team capable of immediate surgery. Case criteria include an injury diagnosis (ICD-9-CM N-Code 800.00 through 959.9) and one or more of the following:

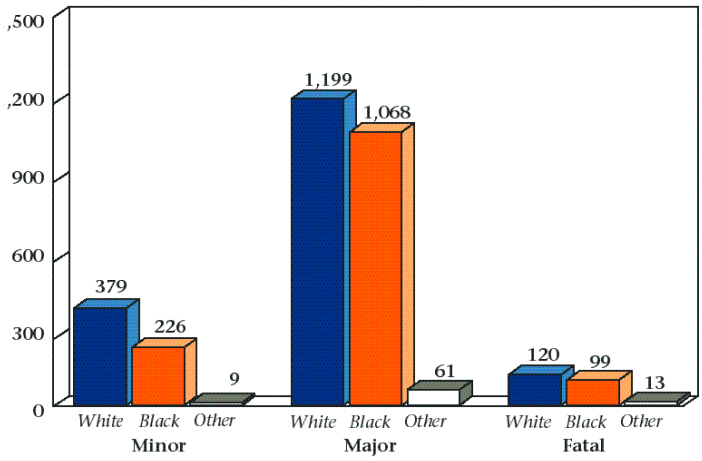
- Transfer from another hospital
- Admission to intensive care
- Hospitalization for three or more days
- Injury of AIS 3 or more or
- Survival probability of 90% or less.

Any patient that was DOA (dead on arrival) or expired is classified as fatal. All others are minor.

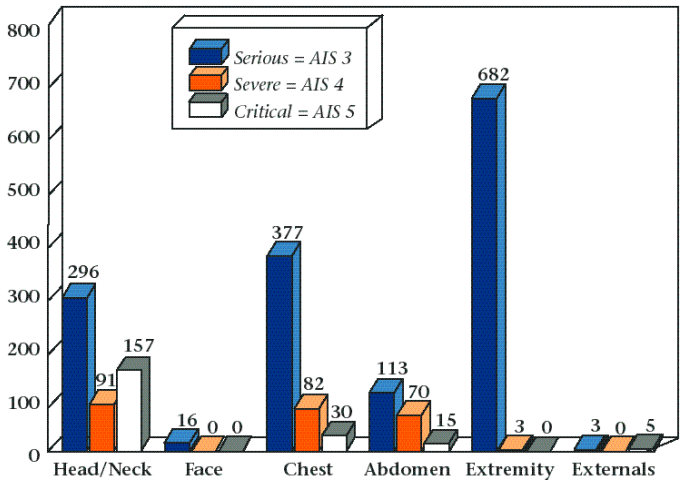
Of 3,174 patients entered with ages recorded in FY'98 into the State Trauma Registry system, 41% were under the age of 25. Listed below is the breakdown of age, sex, and race versus severity of injury.







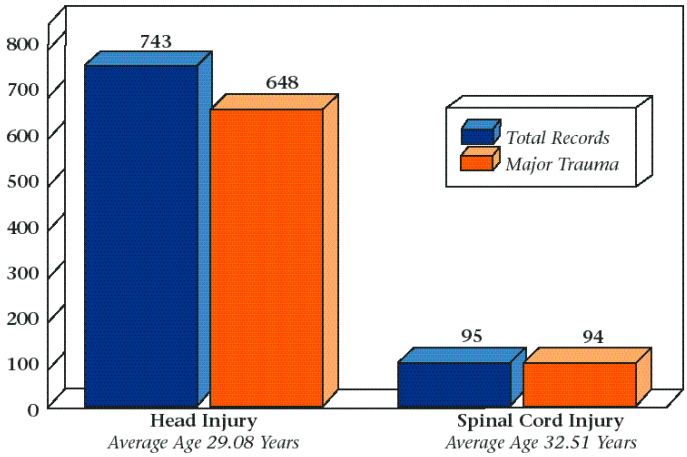
Injury severity is also assigned to individual body regions. In FY'98, over 1,900 serious, severe or critical injuries were reported to the state registry. The table below gives the breakdown of injuries by body region.



There were no injuries reported in FY 1998 with an AIS of 6.

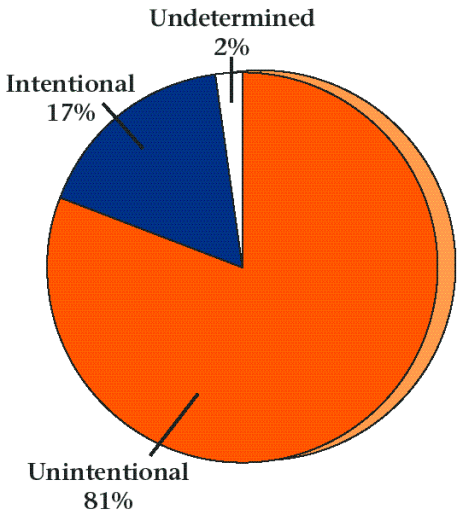
The mean ISS for surviving patients in FY 1998 was 9.9 (with 75 being the maximum), for deaths, the mean ISS was 24.5, and patients being transferred had a mean ISS of 12.1. The mean AIS score (individual injuries) for surviving patients was 2.5, for deaths was 4.0, and transferred patients was 2.8.

Head and spinal cord injuries are often the most serious of traumatic injuries. In the most severe cases, loss of life or loss of quality of life becomes an important issue. Below are statistics on head and spinal cord injuries.



Chapter 3
Types of Injuries and How They Occur

Injuries are classified as intentional, unintentional, or undetermined. Unintentional injuries accounted for 81% of all injuries reported in the State Trauma Registry for FY'98. The breakdown of injuries is shown below.

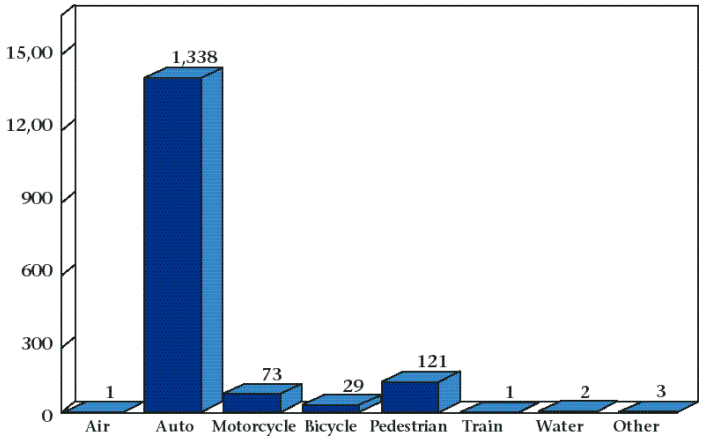


Unintentional Injuries	Percent
Fall	20%
Fire	2%
Transportation	64%
Other	14%

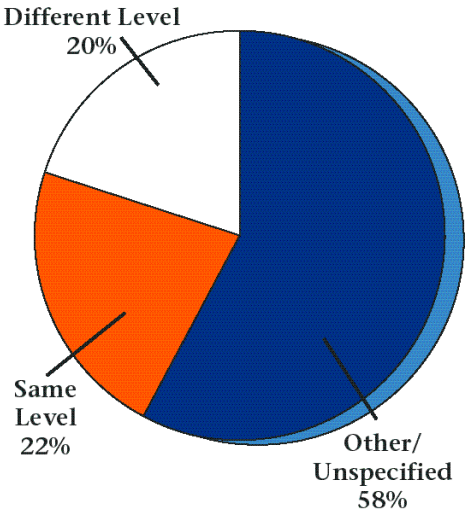
Intentional Injuries	Percent
Versus Another	90%
Versus Self	9%
Legal Intervention	1%

Undetermined	Percent
Firearm	69%
Fall	12%
Pierce/Cut	0%
Other	19%

Injuries sustained from a mode of transportation are the largest group of unintentional injuries. This equalled FY'97 with transportation mechanisms providing 51% of the unintentional injuries. Of the unintentional injuries caused by transportation, ground methods (auto, motorcycle, bicycle, pedestrian, and train) caused 99% of the injuries. The breakdown of transportation injuries is shown below.



Injuries sustained by fall are classified as either same level fall or different level fall. Shown is the breakdown of unintentional injuries sustained by falls in FY'98.

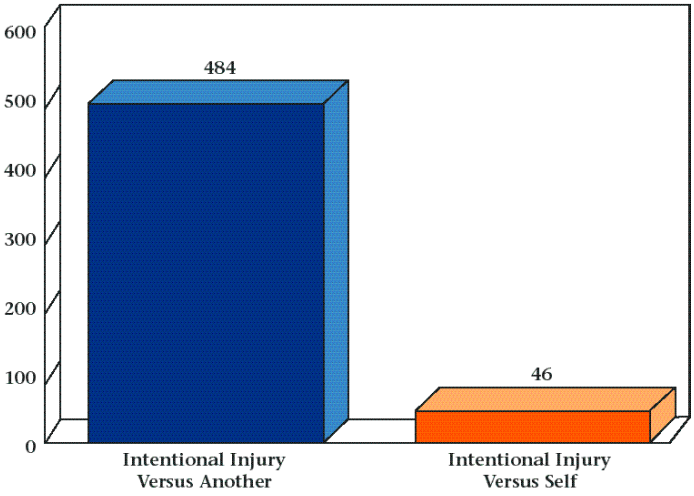


Type Fall	Percent
Different Level	20%
Building	24%
Ladder	41%
Stair	35%
Same Level	22%
Other/Unspecified	58%

Other/unspecified injuries account for 14% of the total for unintentional injuries, making it the second largest group. Several categories are included in this group. They are listed below:

Type	Number
Bite	23
Caught/Crush	13
Collision	41
Cut/Pierce	55
Explosion	0
Firearm	59
Lightning	0
Machinery	72
Natural Disaster	0
Struck, Foreign Object	36
Other/Unspecified	51

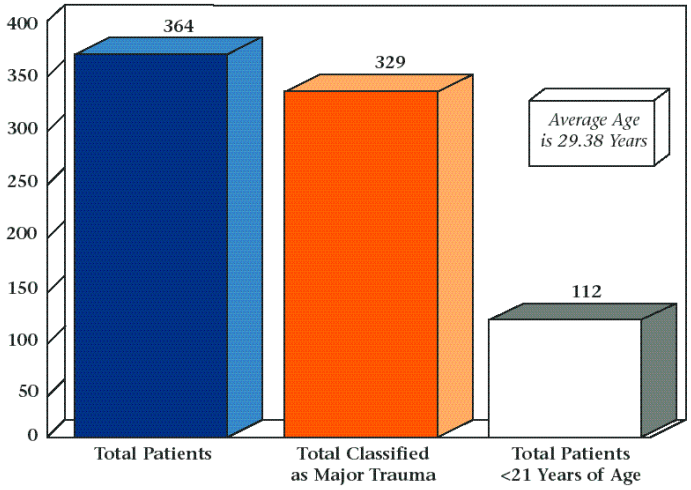
Intentional factors resulted in 537 injuries in FY'98. This is an decrease from 570 in FY'97. Intentional injuries are classified as caused either by self or by another person. The breakdown is below:

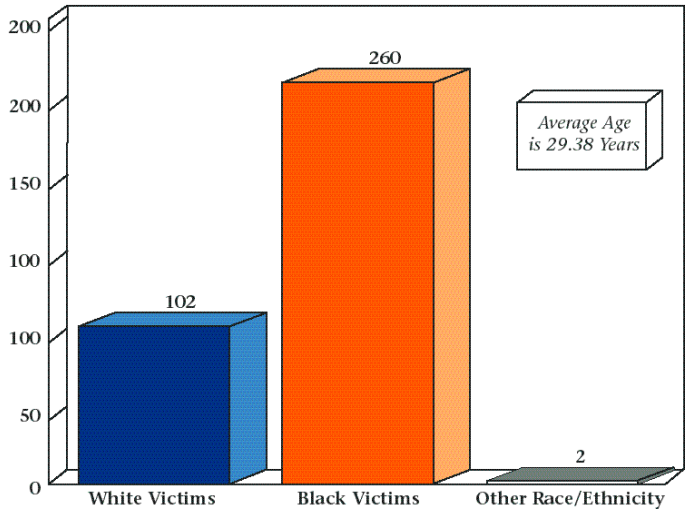


Intentional Injury Versus Another	Number
Firearm	233
Pierce/Cut	106
Strangle	0
Other/Unspecified	145

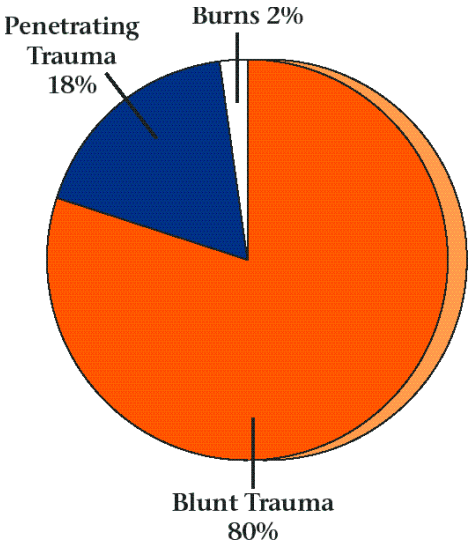
Intentional Injury Versus Self	Number
Firearm	38
Pierce/Cut	4
Hang	0
Jump	1
Other/Unspecified	3

Firearms were responsible for 12% of all injuries reported to the State Trauma Registry in FY'98. Gunshot injuries total 364. Statistics are below:



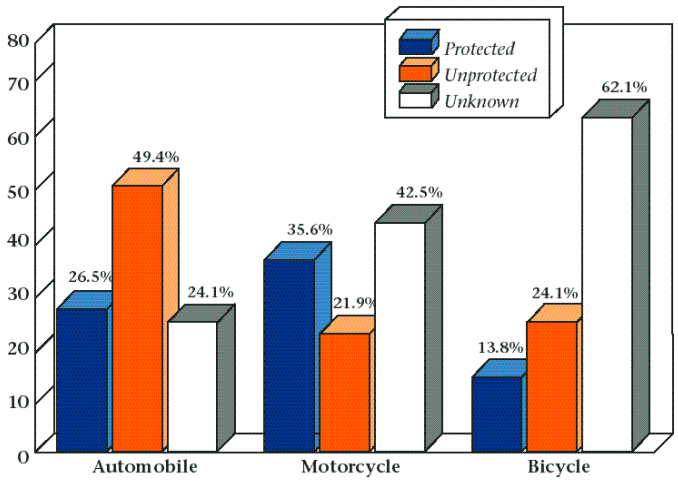


It is often a misconception that a high percentage of trauma is penetrating. The numbers to the right show that in FY'98 this was not the case.



Chapter 4
Efforts to Prevent Injuries

The use of protective devices in mitigation (or prevention) of injuries is slowing increasing. Nearly 49% of the injuries sustained in automobile accidents were unprotected. Over 20 percent of traumatic injuries sustained in motorcycle accidents were unprotected. The statistics below show the number of *injuries* reported to the State Trauma Registry that were protected, unprotected, or unknown. These statistics are not indicators of protective device usage.



Shown below are the percentages of injuries sustained by severity with each protective device listed. (**Note**: some patients received multiple injuries.)

Outcome — Automobile *(in percentages)*

	Minor	Major	Disabled	Fatal
Air Bag	35	40	15	10
Belt/Bag	9	72	16	3
Child Seat	0	100	0	0
Seat Belt	20	64	12	3
None	12	59	21	8
Unknown	19	61	11	10

Outcome — Motorcycle *(in percentages)*

	Minor	Major	Disabled	Fatal
Helmet	12	54	31	4
None	6	63	6	25
Unknown	32	48	13	6

Outcome — Bicycles *(in percentages)*

	Minor	Major	Disabled	Fatal
Helmet	25	50	25	0
None	0	86	14	0
Unknown	22	67	11	0

Alcohol and drug usage play important parts in many traumatic injuries sustained. In some instances, a blood alcohol and/or drug test was performed upon arrival at the hospital. Not all people were tested. Listed is the number of injuries and the results from the *total number tested*:

Alcohol Test Results —

	(N)	>=.10 BAC	<.10 BAC
Automobile	1,338	169	330
Motorcycle	73	14	15
Bicycle	29	1	2
Pedestrian	121	21	13
Fall	521	12	37
Assault	491	76	123
Self-Inflicted	46	8	13
Burn	49	2	1
Other	477	19	35
Unknown	29	0	0
Total	3,174	322	569

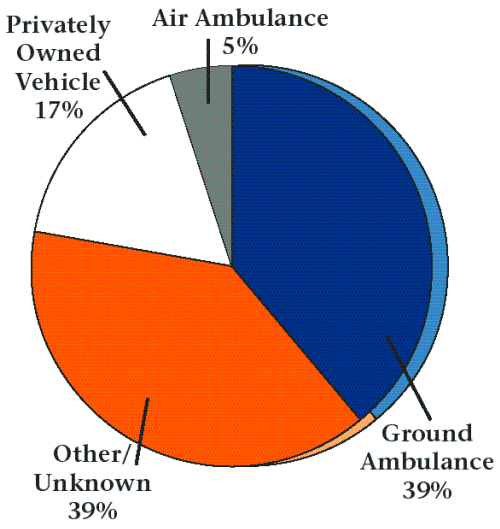
Drug Test Results —

	(N)	Present	Absent
Automobile	1,338	348	31
Motorcycle	73	18	4
Bicycle	29	4	1
Pedestrian	121	28	0
Fall	521	31	4
Assault	491	158	5
Self-Inflicted	46	18	1
Burn	49	2	0
Other	477	42	1
Unknown	29	0	0
Total	3,174	649	47

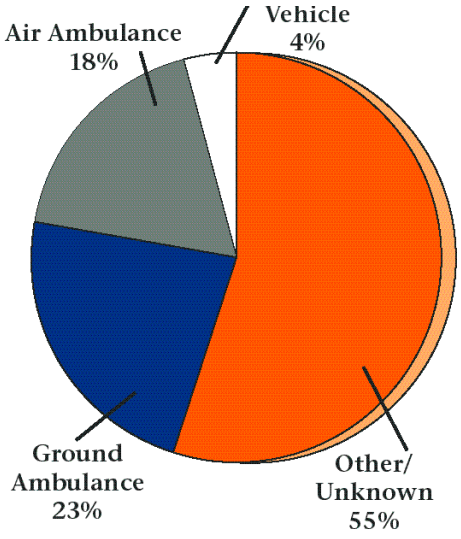
Chapter 5
Care and Length of Stay

Fifty-eight percent of those patients admitted in FY'98 into the trauma registry were transported from the injury scene to a trauma hospital. The other 42% were transferred from other acute care facilities to the trauma hospital.

Below shows the methods of transportation for those patients arriving at the reporting hospital from the injury scene.



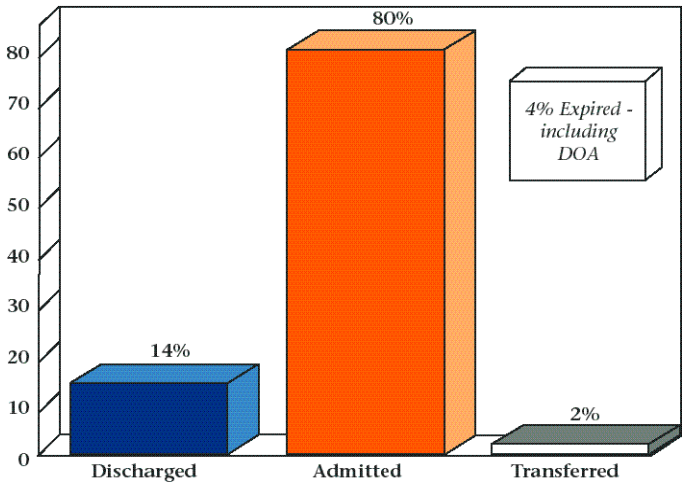
Below shows the methods of transportation for those patients being transferred between facilities.



The table below shows that 45% of emergency department admissions occurred between the hours of 4 p.m. and midnight, with 36% of all admissions occurring on the weekend:

Admission Time —	0001-0800	0801-1600	1601-2400	Percentage of Totals
Sunday	198	162	195	17%
Monday	84	131	197	13%
Tuesday	72	134	214	13%
Wednesday	70	116	154	11%
Thursday	58	145	196	13%
Friday	67	159	219	14%
Saturday	179	163	261	19%
Shift Totals	728	1,010	1,436	
Total	23%	32%	45%	

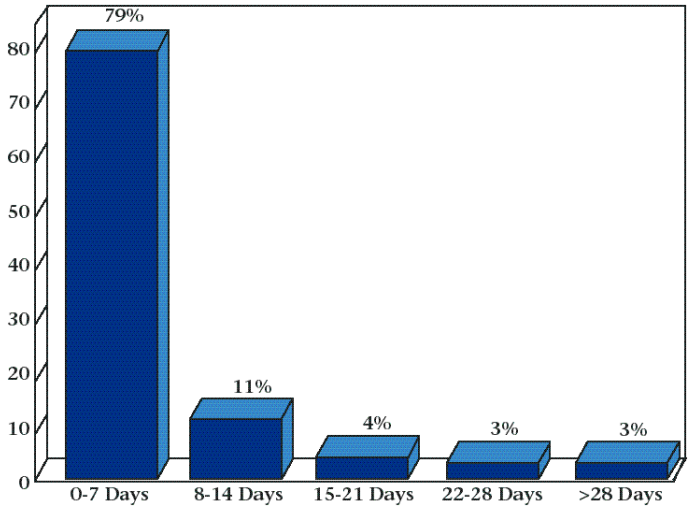
Once patients are admitted to the emergency department and treated, they are sent to the operating room, admitted to the hospital, transferred to another facility or are released from the hospital. Eighty percent of trauma patients in FY'98 were admitted to the reporting hospital. The breakdown of emergency department dispositions is below:



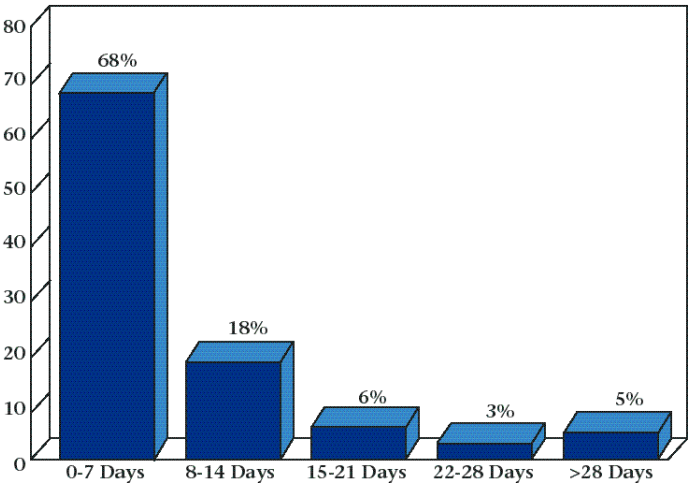
Admitted to Hospital	Percentage
Directly to Observation	1%
Directly to Floor	54%
Directly to Stepdown	1%
Directly to ICU	16%
Directly to Operating Room	29%

The average ICU length of stay for trauma patients in FY'98 was 5.7 days. The average hospital length of stay from trauma patients in FY'98 was 8.8 days. The breakdown for length of stay for those patients admitted to ICU and/or the hospital is listed below. These percentages are consistent with previous years.

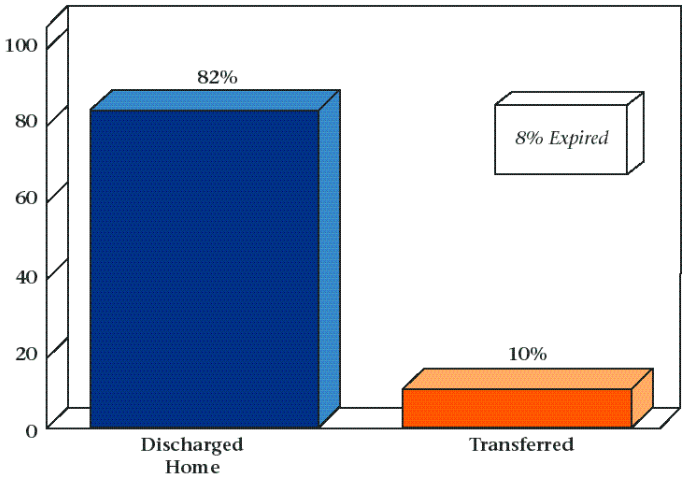
Length of Stay — Intensive Care



Length of Stay — Hospital



Eighty-two percent of trauma patients discharged from the hospital in FY'98 were discharged home. The breakdown of hospital discharge disposition is below:



Transferred to	Percentage
Acute care Hospital	38%
Inter/Residential Facility	1%
Rehabilitation Facility	48%
Skilled Nursing Facility	14%

Of those patients discharged to other facilities, 48% went to a rehabilitation facility. Of those patients referred to rehab, 66% were discharged with good potential for rehabilitation.

Rehabilitation	Number
Fair Potential	99
Good Potential	263
Poor Potential	20
Unknown Potential	17
Total	399

Organ donations coming from trauma patients in the State Trauma Registry in FY'98 reported 232 requests resulting in one liver donation, one cornea donation, one heart donation, and nine patients with multiple, unspecified donations. The other requests for donation were either refused or unsuitable.

Chapter 6
Trauma Costs to Mississippi

Trauma is historically a high cost, low-reimbursement disease for treating facilities. In FY'98, financial information was submitted to the state registry for *1,660 patients*. The average collection rate was 40 cents on the dollar. The table below breaks down charges vs. collections by payer source. Totals as of June 30, 1998 are as follows:

	Patients	Charges	Collections
Automotive	12	$239,365	$65,349
Champus	12	$100,740	$43,548
HMO/PPO	6	$52,062	$245
Medicaid	148	$1,594,448	$698,009
Medicare	183	$1,943,305	$1,406,813
Private	568	$7,653,518	$3,732,424
Self Pay	486	$6,714,000	$1,460,668
Victim's	0	$0	$0
Worker's	93	$849,546	$450,014
Other	74	$1,059,489	$376,267
Unknown	78	$ 488,691	$ 141,474
Total	1,660	$20,695,164	$8,374,811
Average		$12,467	$5,045

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- National Vital Statistics Report, Vol 47, No. 4, 32-33:October 7, 1998
- Vital Statistics Mississippi 1997, Mississippi State Department of Health, 23-24, 30:1997
- Copes WS, Sacco JW, Champion HR, Bain LW, “Progress in Characterizing Anatomic Injury”, In Proceedings of the 33rd Annual Meeting of the Association for the Advancement of Automotive Medicine, Baltimore, MA USA 205-218
- Baker SP et al, “The Injury Severity Score: a method for describing patients with multipleinjuries and evaluating emergency care”, J Trauma 14:187-196:1974

Notes

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